

CLAIMS

1. A breathing apparatus including a breathing circuit, the breathing circuit including:

- a mouthpiece;
- at least one gas carrying conduit;
- a compressed gas source; and
- a counterlung,

wherein the compressed gas source is in communication with the counterlung via the breathing circuit and wherein the counterlung includes an expansion assisting means and a contraction assisting means.

2. A breathing apparatus according to claim 1 further including a control to selectively activate one of the expansion assisting means and the contraction assisting means.

3. A breathing apparatus according to claim 1 wherein the counterlung includes:

- a primary chamber, and
- a secondary chamber,

wherein inflation of the secondary chamber causes inflation of the primary chamber.

4. A breathing apparatus according to claim 3 wherein the expansion assisting means are associated with the secondary chamber.

5. A breathing apparatus according to claim 4 wherein the expansion assisting means comprises a flow of the compressed gas source.

6. A breathing apparatus according to claim 3 wherein the contraction assisting means is associated with the primary chamber.

7. A breathing apparatus according to claim 6 wherein the contraction assisting means is a spring which is biased towards contraction of the primary chamber.

8. A breathing apparatus according to claim 1 wherein the secondary chamber is formed within the primary chamber.

9. A breathing apparatus according to claim 8 wherein the secondary chamber communicates directly with the breathing circuit and does not communicate directly with the primary chamber.

10. A breathing apparatus according to claim 3 wherein the breathing circuit includes:

- a primary breathing circuit, and
- a secondary breathing circuit,

wherein the primary breathing circuit connects the primary gas chamber to the mouthpiece and the secondary breathing circuit connects the secondary chamber to the mouthpiece.

11. A breathing apparatus according to claim 10 wherein the mouthpiece includes:

- a pressure operated mouthpiece switch;
- a first valve;
- a mouthpiece chamber; and
- a mouthpiece outlet,

the switch being operable to respond to a reduction in pressure to operate the valve to allow gas from the primary gas chamber, via the primary breathing circuit, and gas

from the secondary gas chamber, via the secondary breathing circuit, to enter the mouthpiece chamber, the mouthpiece chamber being in communication with the mouthpiece outlet.

12. A breathing apparatus according to claim 10 wherein the mouthpiece includes:

- a pressure operated mouthpiece switch;
- a first valve;
- a second valve;
- a mouthpiece chamber; and
- a mouthpiece outlet,

the switch being operable to respond to an increase in pressure to operate the second valve to allow compressed gas from the compressed gas source to enter the secondary gas chamber via the secondary breathing circuit.

13. A breathing apparatus according to claim 12 wherein only one of the first and second valves can be opened at any one time.

14. A breathing apparatus according to claim 10 wherein the apparatus further includes a non-return valve to prevent exhaled gas from entering the secondary breathing circuit.

15. A breathing apparatus according to claim 3 wherein the mouthpiece includes an exhaust valve to exhaust, in use, any excess gas that a user continues to exhale after the primary gas chamber is fully expanded.

16. A breathing apparatus according to claim 10 wherein the secondly breathing circuit includes:

a first conduit for carrying the compressed gas to the secondary gas chamber for inflation thereof; and

a second conduit for connecting the secondary gas chamber to the mouthpiece chamber for carrying gas from the secondary gas chamber to the mouthpiece.

17. A breathing apparatus according to claim 16, further including a top-up valve, the compressed gas source being connected to the secondary conduit of the secondary breathing circuit via the top-up valve, the top-up valve being operable in the event that the primary chamber is completely collapsed.

18. A breathing apparatus according to claim 1, further including a carbon dioxide scrubber.

19. A breathing apparatus according to claim 10, further including a carbon dioxide scrubber, wherein the carbon dioxide scrubber is included in the primary breathing circuit.

20. A breathing apparatus including a breathing circuit, the breathing circuit including:

- a mouthpiece;
- at least one gas carrying conduit;
- a compressed gas source;
- a counterlung,

wherein the compressed gas source is in communication with the counterlung via the breathing circuit and wherein the counterlung includes:

- a primary chamber;
- a secondary chamber;

an expansion assisting means associated with the secondary chamber;

a contraction assisting means which is a spring which is biased towards contraction of the primary chamber; wherein the secondary chamber is formed within the primary chamber and wherein inflation of the secondary chamber causes inflation of the primary chamber, the breathing circuit further including:

a primary breathing circuit;

a secondary breathing circuit; and

a carbon dioxide scrubber,

wherein the primary breathing circuit connects the primary gas chamber to the mouthpiece and the secondary breathing circuit connects the secondary chamber to the mouthpiece, and wherein the carbon dioxide scrubber is included in the primary breathing circuit.